

What is claimed:

1. A method for use with an electro-kinetic air transporter and conditioner device including a high voltage generator that provides a potential difference between at least one emitter electrode and at least one collector electrode, wherein the high voltage generator is driven by both (1) a DC voltage obtained from an AC voltage source and (2) a low voltage pulse signal, the method comprising:
  - (a) stepping down the DC voltage to produce a voltage sense signal indicative of a level of AC voltage source;
  - (b) monitoring the voltage sense signal; and
  - (c) adjusting at least one of a pulse width, duty cycle and frequency of the low voltage pulse signal, based on the monitored voltage sense signal, in order to substantially maintain the potential difference at a desired level.
2. The method of claim 1, wherein the desired level is based on a control dial setting.
3. The method of claim 1, wherein the desired level is a selected one of a plurality of predetermined levels.
4. The method of claim 1, wherein the desired level relates to the AC voltage source having a nominal 110 VAC level.

5. The method of claim 1, wherein step (c) comprises:

increasing at least one of the pulse width, duty cycle and frequency of the low voltage pulse signal if the monitored voltage sense signal indicates that the level of the AC voltage source is below a nominal level; and

decreasing at least one of the pulse width, duty cycle and frequency of the low voltage pulse signal if the monitored voltage sense signal indicates that the level of the AC voltage source is above the nominal level.

6. An electro-kinetic air transporter and conditioner device, comprising:

a micro-controller unit to produce a low voltage pulse signal;

a DC power supply to receive an incoming AC voltage and produce a first DC voltage therefrom, the first DC voltage indicative of the incoming AC voltage;

a step down circuit to step down the first DC voltage to a second DC voltage that can be monitored by the micro-controller unit without damaging the micro-controller unit, the second DC voltage also indicative of the incoming AC voltage;

an electrode configuration including at least one emitter electrode and at least one collector electrode; and

high voltage generator to provide a potential difference between the at least one emitter electrode and the at least one collector electrode, wherein the high voltage generator is driven by both (1) the first DC voltage produced by the DC power supply and (2) the low voltage pulse signal produced by the micro-controller unit;

wherein the micro-controller unit monitors the second DC voltage and adjusts at least one of

a pulse width, duty cycle and frequency of the low voltage pulse signal, based on the monitored second DC voltage, in order to substantially maintain the potential difference at a desired level.

7. The device of claim 6, wherein the desired level is based on a control dial setting.
8. The device of claim 6, wherein the desired level is a selected one of a plurality of predetermined levels.
9. The device of claim 6, wherein the desired level relates to the incoming AC voltage having a nominal 110 VAC level.
10. The device of claim 6, wherein the micro-controller unit is adapted to:  
  
increase at least one of the pulse width, duty cycle and frequency of the low voltage pulse signal if the monitored second DC voltage indicates that the level of the incoming AC voltage is below a nominal level; and  
  
decrease at least one of the pulse width, duty cycle and frequency of the low voltage pulse signal if the monitored voltage sense signal indicates that the level of the incoming AC voltage is above the nominal level.
11. The device of claim 6, wherein the step down circuit includes a resistor network.
12. The device of claim 6, wherein the high voltage generator includes:

a step-up transformer including a primary side and a secondary side;

an electronic switch that couples the low voltage signal from the micro-controller unit to the primary side of the step-up transformer, the primary side also coupled to the first DC voltage; and

a voltage doubler coupled to the secondary side of the step-up transformer, the voltage doubler producing a high voltage signal that provides the potential difference between the at least one emitter electrode and the at least one collector electrode, a level of the high voltage signal being based on the pulse width, duty cycle and frequency of the low voltage pulse signal.

13. The device of claim 12, wherein the electronic switch comprises an insulated gate bipolar transistor.

14. A method for use with an electro-kinetic air transporter and conditioner device including a high voltage generator that provides a potential difference between at least one emitter electrode and at least one collector electrode, the method comprising:

- (a) monitoring a voltage sense signal indicative of a level of an AC voltage source used to power the device;
- (b) if the voltage sense signal falls below a nominal level, increasing at least one of a pulse width, duty cycle and frequency of a low voltage pulse signal that drives the high voltage generator; and
- (c) if the voltage sense signal rises above the nominal level, decreasing at least one of the pulse width, duty cycle and frequency of the low voltage pulse signal that drives the high voltage generator.

15. The method of claim 14, further comprising producing a high voltage signal based on the low voltage pulse signal, the high voltage signal providing the potential difference between the at least one emitter electrode and the at least one collector electrode.

16. An electro-kinetic air transporter and conditioner device, comprising:

a high voltage generator that provides a potential difference between at least one emitter electrode and at least one collector electrode;

a controller adapted to monitor a voltage sense signal indicative of a level of an AC voltage source; and

the controller further adapted to:

increase at least one of a pulse width, duty cycle and frequency of a low voltage pulse signal that drives the high voltage generator, if the voltage sense signal falls below a nominal level; and

decrease at least one of the pulse width, duty cycle and frequency of the low voltage pulse signal that drives the high voltage generator, if the voltage sense signal climbs above the nominal level.

17. A method for use with an electro-kinetic air transporter and conditioner device including a high voltage generator that provides a potential difference between at least one emitter electrode and at least one collector electrode, the method comprising:

(a) monitoring an AC voltage source that is used to power the electro-kinetic device; and

(b) adjusting a signal that drives the high voltage generator, based on the monitoring results of step (a), in order to substantially maintain the potential difference at a desired level.